

Appendix I

Virtrinite Reflectance Analysis Results of Cutting Samples

Client: MGM Energy Corp.
Well Name: MGM Shell East Mackay I-78
UWI: 3001786450125300

Vitrinite Reflectance Report Weatherford Project: CL-61558

Introduction:

Twenty seven polished whole rock cutting samples from the 1400 to 1938M interval are analyzed for vitrinite reflectance thermal maturity (%Ro), for a very basic estimate of relative abundances of visual kerogen types and other kerogen characteristics. Maturity data indicate that the upper 9 samples are in the 'Immature' zone and that the deeper 18 samples are into the early 'Oil window maturity' zone (Table 1). Amorphous kerogen dominates over terrestrial kerogen in these 27 samples.

Discussion:

The Ro values increase from 0.50% to 0.77%. Vitrinite is sparse in many of these samples and the desired 40 vitrinite particle readings per sample are not obtained in 17 of them. Vitrinite reflectance data quality is considered to be reasonably good overall.

Solid bitumen particles are noted in nearly all of these samples. Their presence is a clue that some liquid hydrocarbon generation has likely occurred in the past. Reflectance readings taken on solid bitumen particles are included on Table 4a to the right side of the vitrinite reflectance readings in Table 4. Keeping track of solid bitumen reflectance can help in trying to assure that solid bitumen particles are not confused as being vitrinite particles.

Framboidal pyrite abundance varies from common to super abundant in these samples (Table 3). This may be indicative of marine influence. The sulfate reducing bacterial activity on organic matter in marine deposits reportedly can result in this type of pyrite. It is normally most common in hydrogen rich (reducing) marine source rocks. The pyritized fossils and hollow spines noted in 23 samples likely indicate a marine depositional environment. The framboidal pyrite is so abundant in some samples that it appears to make up a majority of the rock matrix.

Vitrinite and TAI values are generally divided into the following categories of thermal maturity:

Immature:	0.02% to 0.60%	TAI up to 2+ (2.3)
Oil window maturity:	0.60% to 1.10%	TAI 2+(2.3) up to 3+(3.3)
Condensate and /or wet-gas window:	1.10% to 1.40%	TAI 3+ (3.3)
Dry gas window:	1.40% to 3.0 or 4.0%	TAI 4-(3.7) and higher

Dan Pearson
For Weatherford Laboratories

TABLE 22
DISPERSED ORGANIC MATTER THERMAL ALTERATION, KEROGEN TYPE AND TOTAL COMPOSITIONAL ANALYSIS
RESULTS

Client ID	WFT ID	Well Name	Client ID	Depth 1	Depth 2	Depth Units	Type	Color	TAI	% Source Material						Preservation				Recovery		% Kerogen Comp.						Vitrinite				Comments		
										Amorphous Debris	Finely Dissem. OM	Herb. Plant Debris (V/L)	Woody Plant Debris	Coaly Fragments	Algal Debris	Palynomorphs	Good	Fair	Poor	Very poor	Good	Very Poor	Barren	Indigenous Vitrinite	Caved Vitrinite	Recycled/Oxidized Vitrinite	Inertinite	Solid Bitumen	Drilling Additive/Contamination	Amorphous Kerogen	# of Readings		Total Sample Ro (%)	# of Indigenous Readings
C1-GEO	1500070660	Mackay I-78	Slater	1400		M	R			88		12				X							2		10	10	tr		78	40	0.48	32	0.50	
C2-GEO	1500070666	Mackay I-78	Slater	1405		M	R			89		11				X							1		10	5			84	40	0.51	34	0.51	
C3-GEO	1500070670	Mackay I-78	Slater	1410		M	R			96		4				X							1		3	1	tr		95	40	0.54	37	0.53	
C4-GEO	1500070674	Mackay I-78	Slater	1415		M	R			99		1				X							tr		1	1	2		96	19	0.59	14	0.53	
C5-GEO	1500070680	Mackay I-78	Slater	1420		M	R			98		2				X							1		1	1	1		96	40	0.55	37	0.53	pyritized hollow spines
C6-GEO	1500070684	Mackay I-78	Slater	1425		M	R			98		2				X							1		1	1	1		96	31	0.56	25	0.53	pyritized fossils.
C7-GEO	1500070690	Mackay I-78	Slater	1430		M	R			98		2				X							1		1	1	tr		97	40	0.55	37	0.53	pyritized fossils.
C8-GEO	1500070694	Mackay I-78	Slater	1435		M	R			98		2				X							1		1	1	1		96	23	0.56	20	0.53	pyritized fossils.
C9-GEO	1500070700	Mackay I-78	Arctic	1440		M	R			98		2				X							1		1	1	1		96	40	0.56	36	0.54	pyritized fossils.
C15-GEO	1500070716	Mackay I-78	Canyon	1755		M	R			98		2				X							1		1	1	1		96	40	0.64	38	0.63	pyritized fossils.
C16-GEO	1500070720	Mackay I-78	Imperial	1765		M	R			99		1				X							1		tr	tr	2		97	40	0.65	38	0.63	pyritized fossils.
C17-GEO	1500070724	Mackay I-78	Imperial	1770		M	R			99		1				X							1		tr	tr	2		97	40	0.67	39	0.66	pyritized fossils.
C18-GEO	1500070730	Mackay I-78	Imperial	1775		M	R			99		1				X							1		tr	tr	1		98	29	0.69	26	0.66	pyritized fossils.
C19-GEO	1500070734	Mackay I-78	Imperial	1780		M	R			99		1				X							1		tr	tr	1		98	30	0.72	24	0.68	pyritized fossils.
C32-GEO	1500070738	Mackay I-78	Canol	1870		M	R			100		tr				X							tr		tr	tr	1		99	12	0.80	10	0.74	pyritized fossils.
C33-GEO	1500070744	Mackay I-78	Canol	1875		M	R			100		tr				X							tr		tr	tr	3		98	9	0.79	8	0.73	pyritized fossils.
C34-GEO	1500070748	Mackay I-78	Canol	1880		M	R			100		tr				X							tr		tr	tr	2		98	10	0.82	9	0.75	pyritized fossils.
C35-GEO	1500070754	Mackay I-78	Canol	1885		M	R			100		tr				X							tr		tr	tr	1		99	8	0.85	5	0.73	pyritized fossils.
C36-GEO	1500070758	Mackay I-78	Canol	1890		M	R			100		tr				X							tr		tr	tr	1		99	7	0.78	6	0.76	pyritized fossils.
C37-GEO	1500070764	Mackay I-78	Canol	1895		M	R			100		tr				X							tr		tr	tr	1		99	9	0.79	7	0.73	pyritized fossils.
C38-GEO	1500070768	Mackay I-78	Canol	1900		M	R			100		tr				X							tr		tr	tr	1		99	5	0.79	4	0.77	pyritized fossils.
C39-GEO	1500070774	Mackay I-78	Canol	1905		M	R			100		tr				X							tr		tr	tr	1		99	12	0.86	8	0.78	pyritized fossils.
C40-GEO	1500070778	Mackay I-78	Canol	1910		M	R			100		tr				X							tr		tr	tr	1		99	11	0.86	8	0.77	pyritized fossils.
C42-GEO	1500070788	Mackay I-78	Indian	1925		M	R			100		tr				X							tr		tr	tr	2		98	14	0.83	10	0.77	pyritized fossils.
C43-GEO	1500070794	Mackay I-78	Indian	1930		M	R			100		tr				X							tr		tr	tr	2		98	20	0.84	13	0.75	pyritized fossils.
C44-GEO	1500070798	Mackay I-78	Indian	1935		M	R			99		1				X							1		tr	1	2		96	40	0.78	36	0.75	pyritized fossils.
C45-GEO	1500070804	Mackay I-78	Bluefish	1938		M	R			99		1				X							1		tr	tr	2		97	28	0.79	26	0.77	pyritized fossils.

tr = trace

TAI Scale: 1=Unaltered

3+ or 3.5

Color

Abbreviations:

GLY Green-Light Yellow
Y Yellow
YO Yellow-Orange
OB Orange-Brown
LB Light Brown

B Brown
BDG Dark Brown-Dark Gray
DGBL Dark Gray-Black
BLK Black

1+ or 1.5

2=Slight alteration

2+ or 2.5

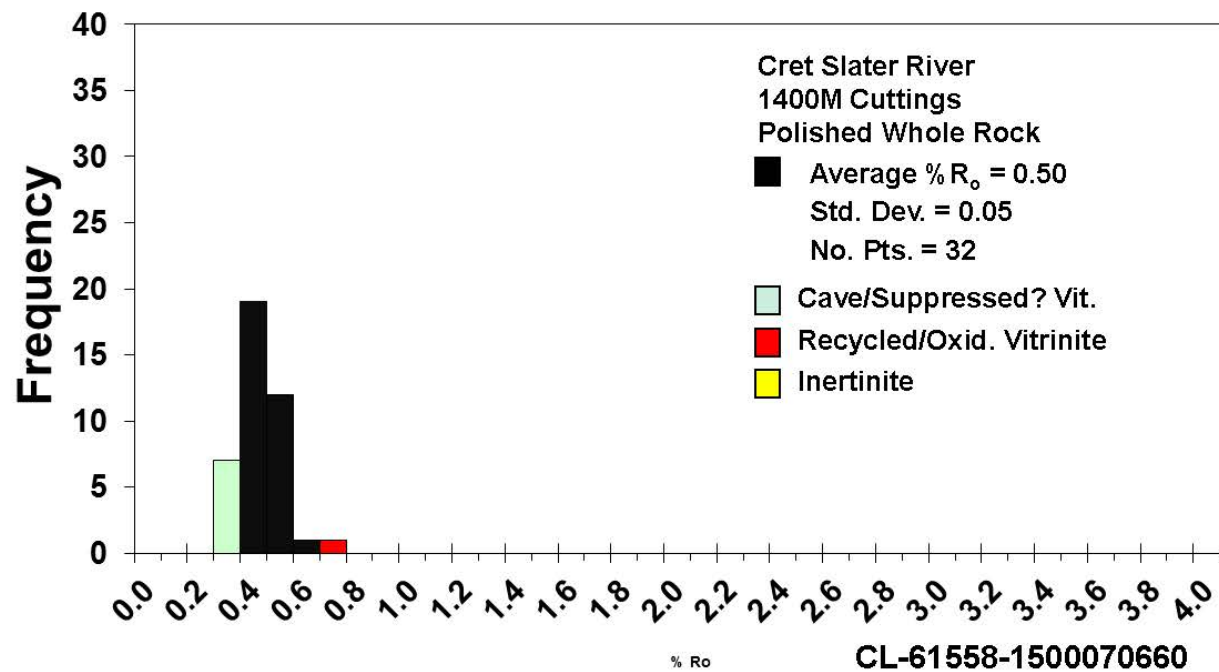
3=Moderate alteration

4=Strong alteration

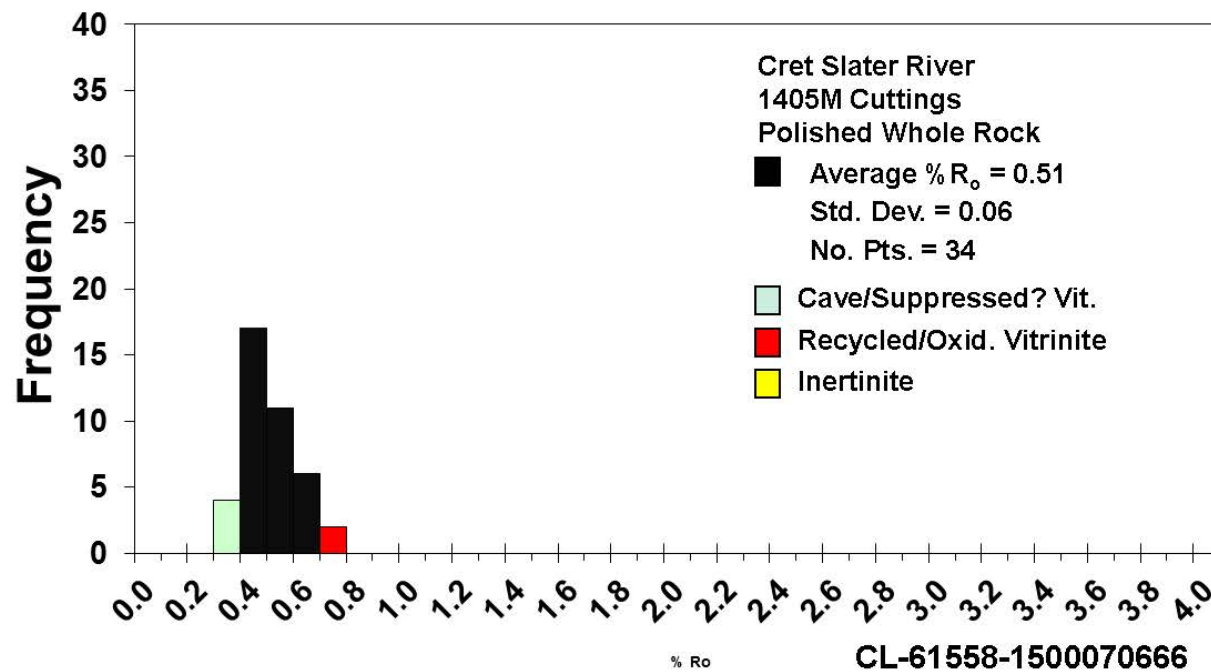
4+ or 4.5

5=Severe alteration

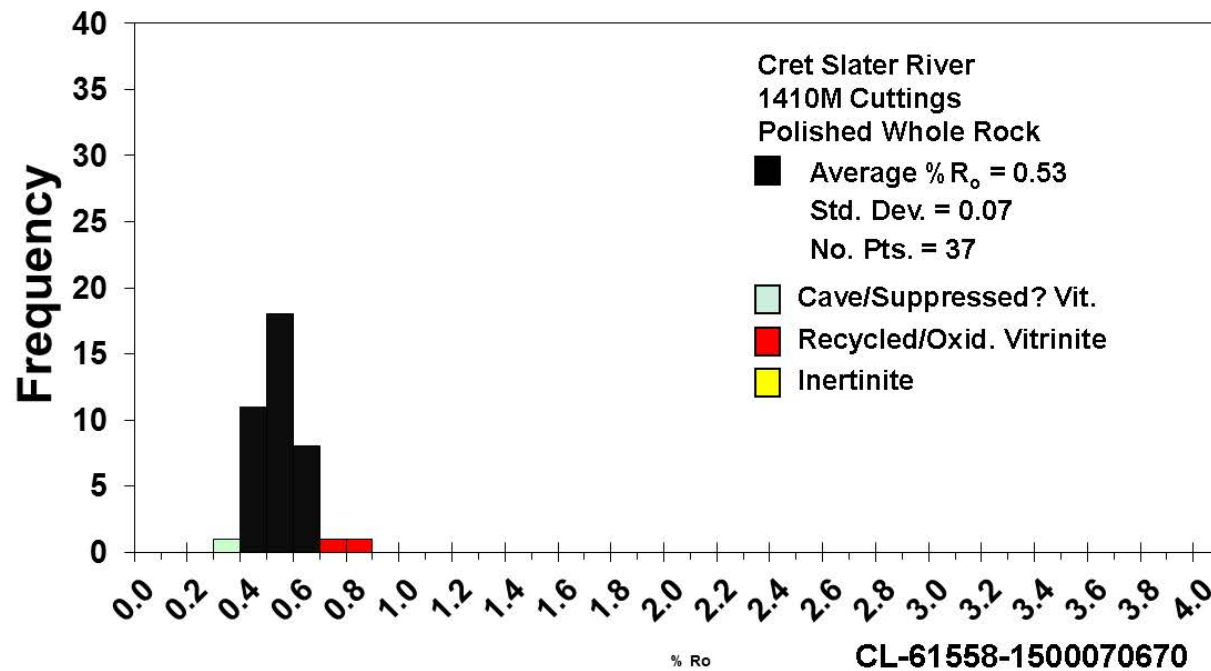
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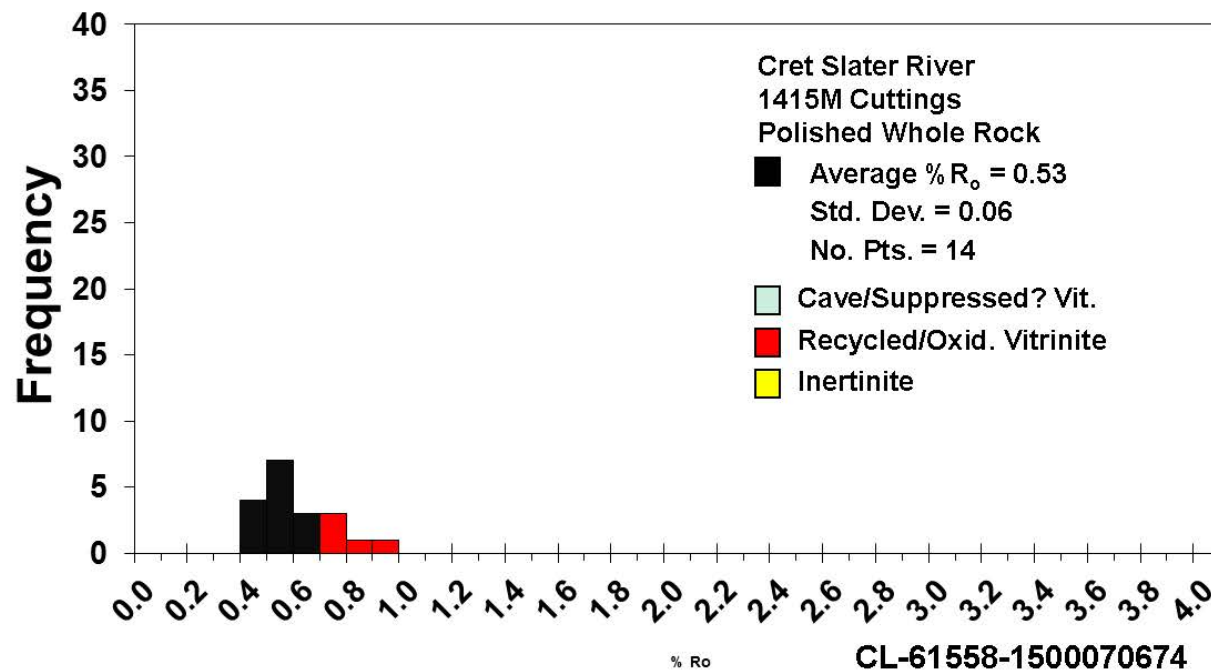
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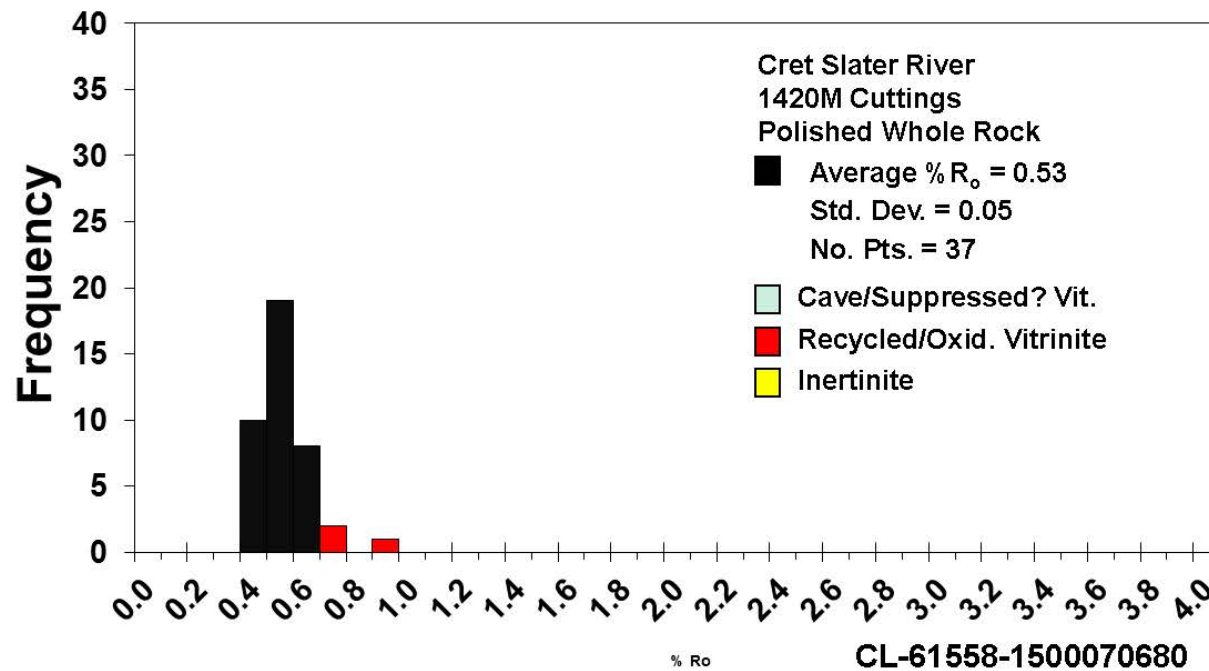
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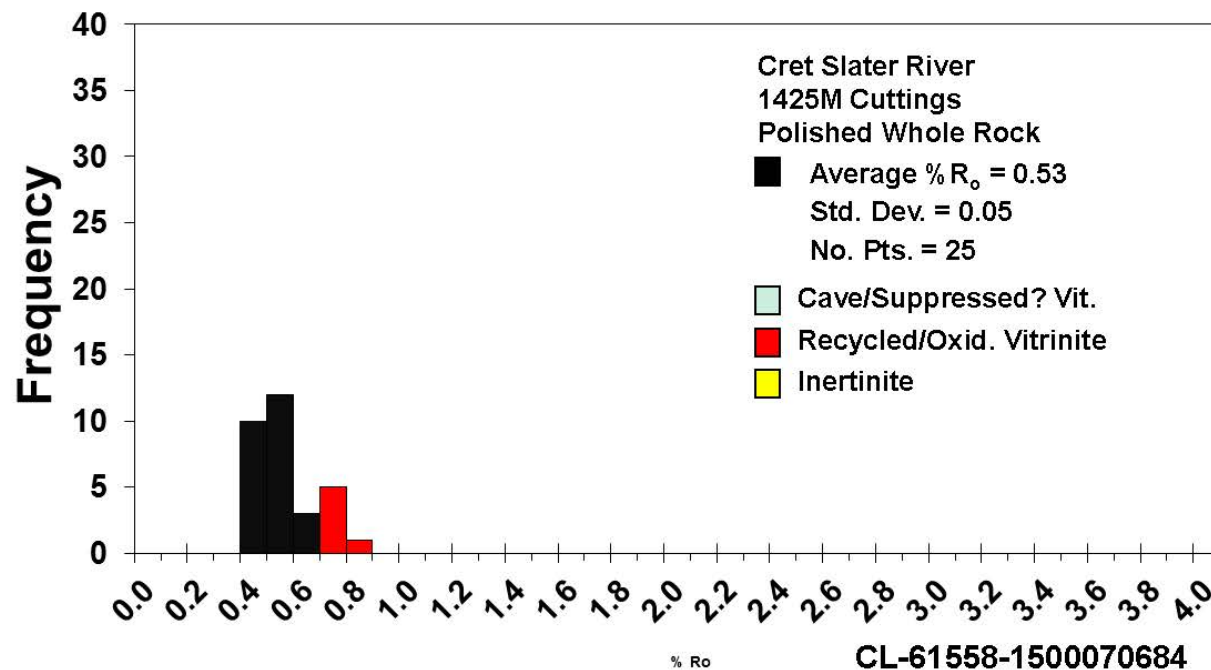
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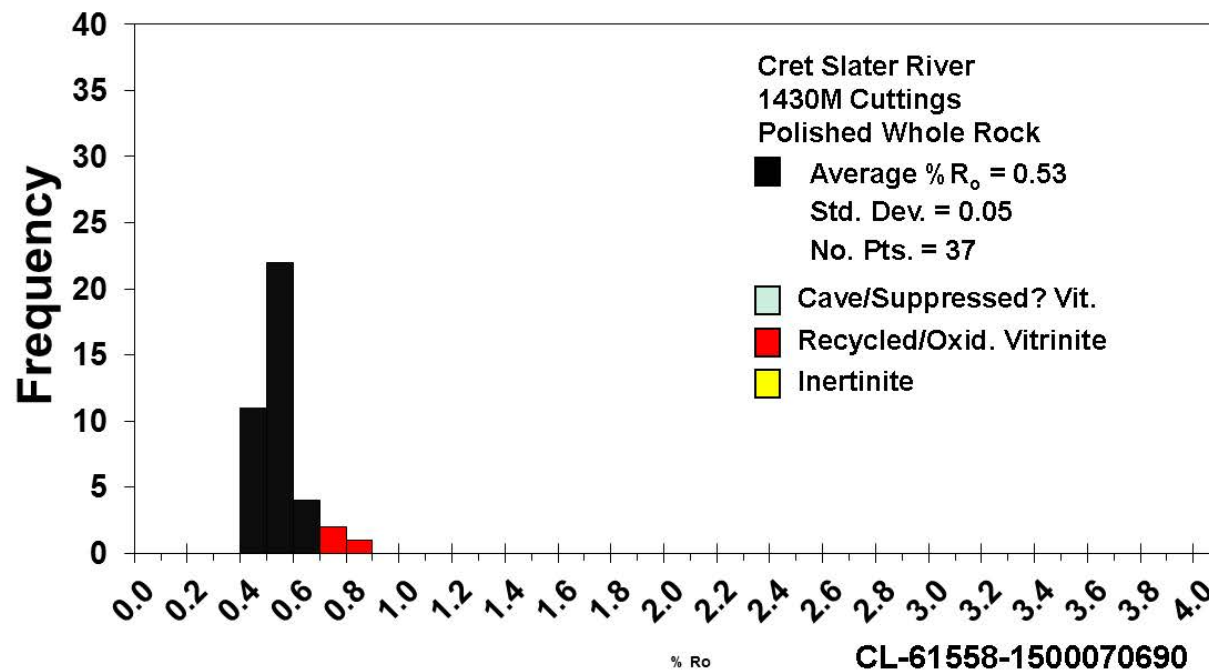
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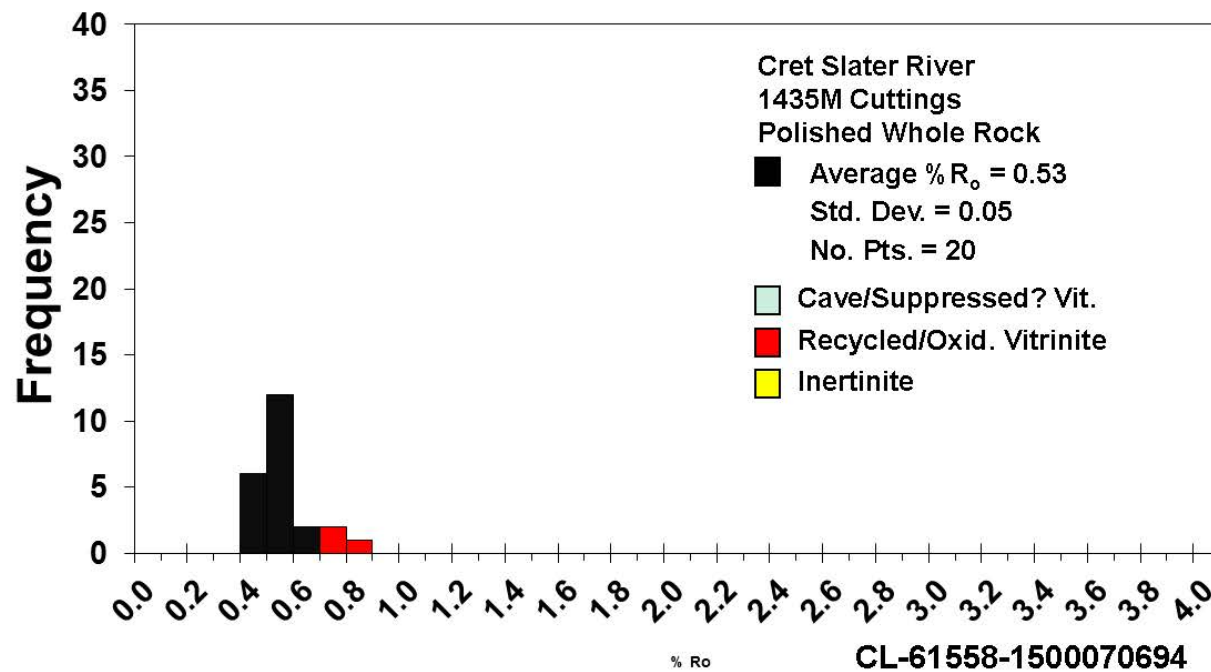
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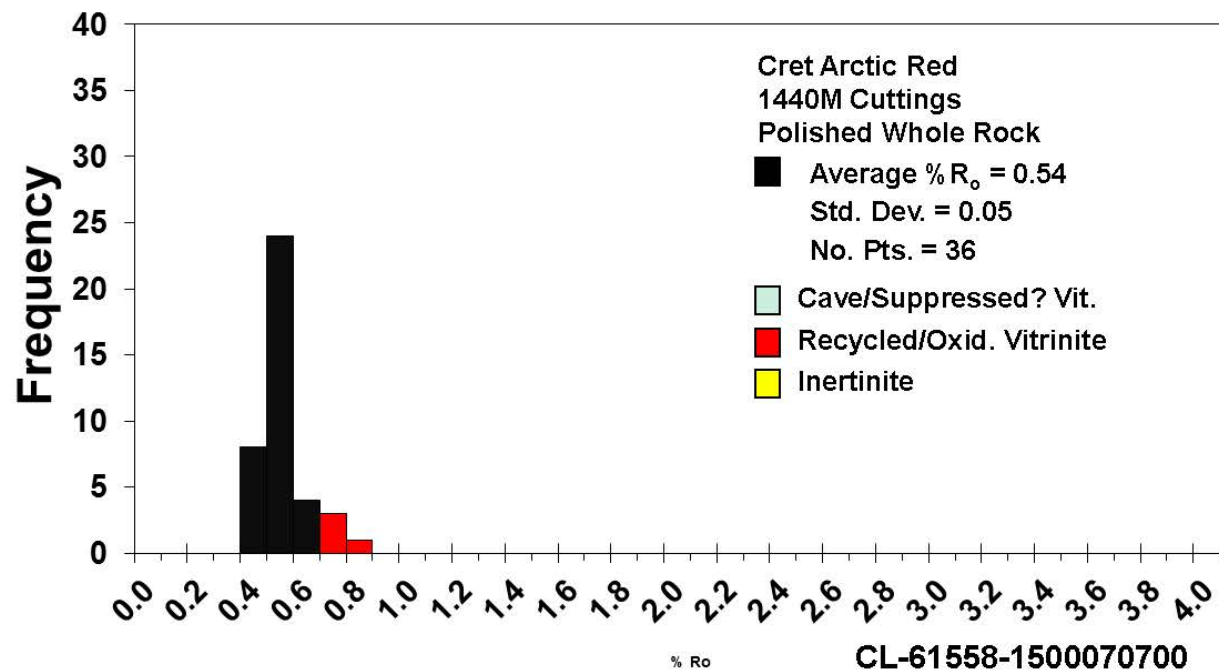
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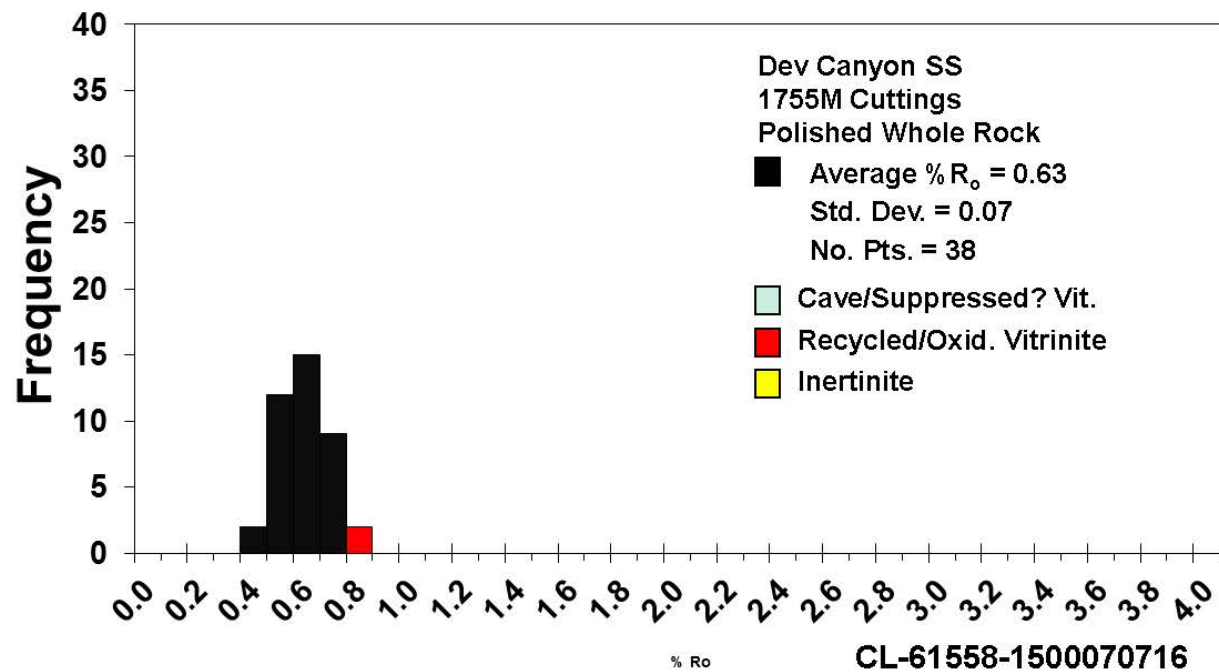
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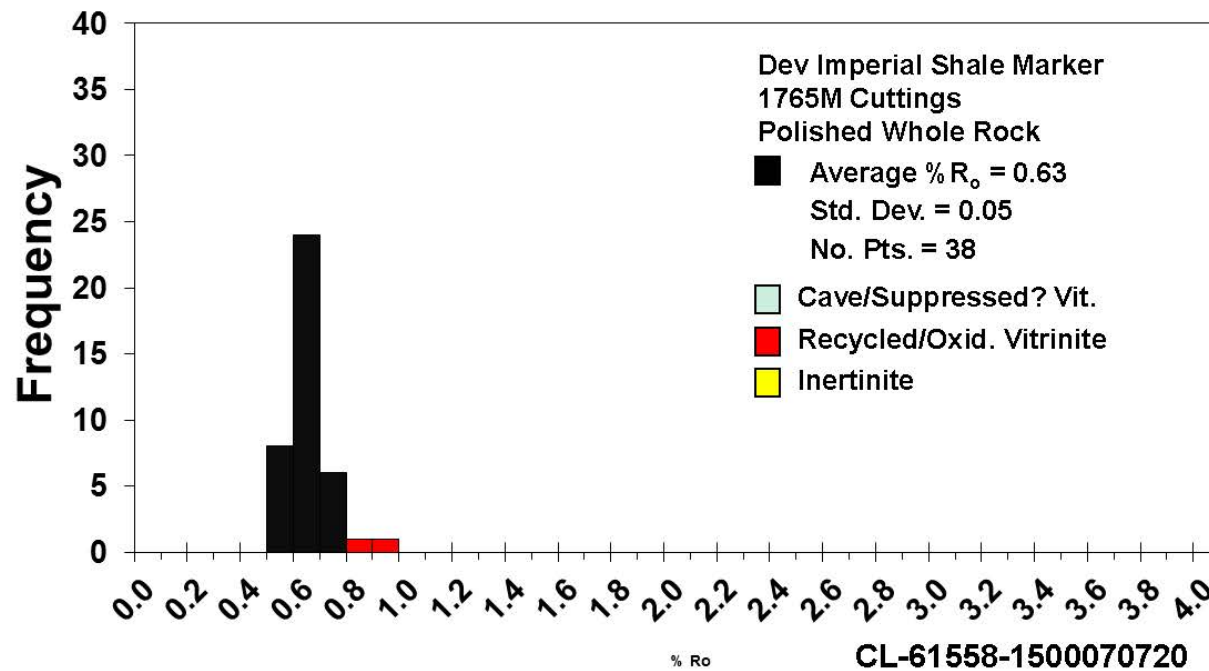
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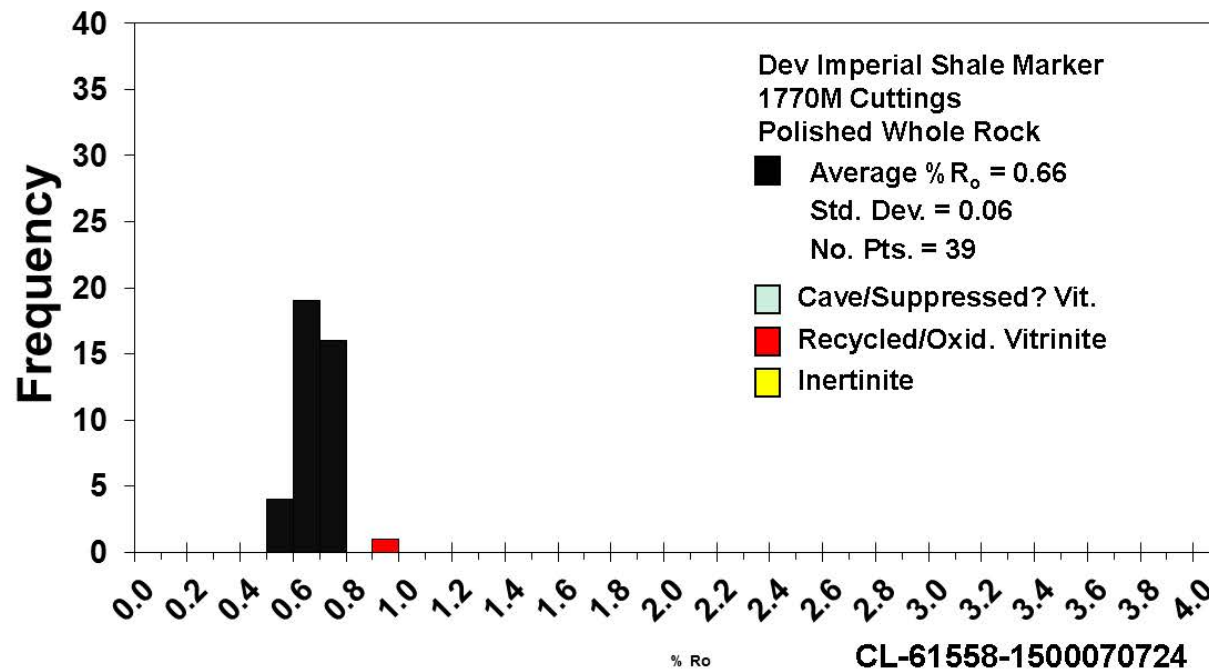
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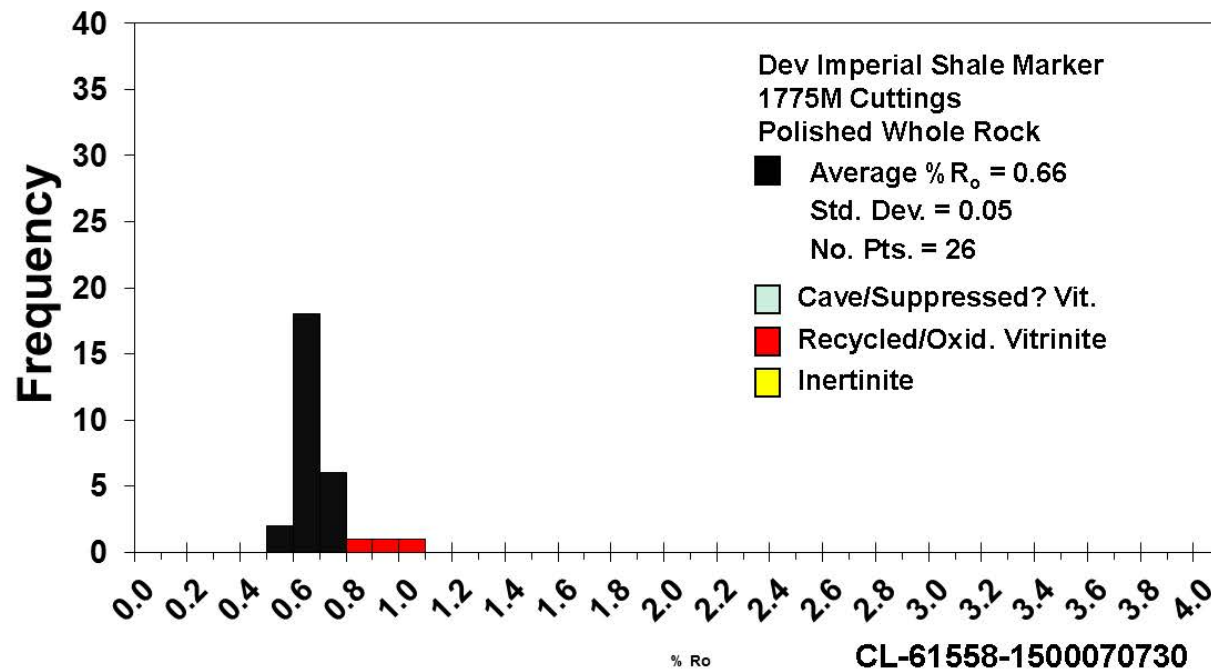
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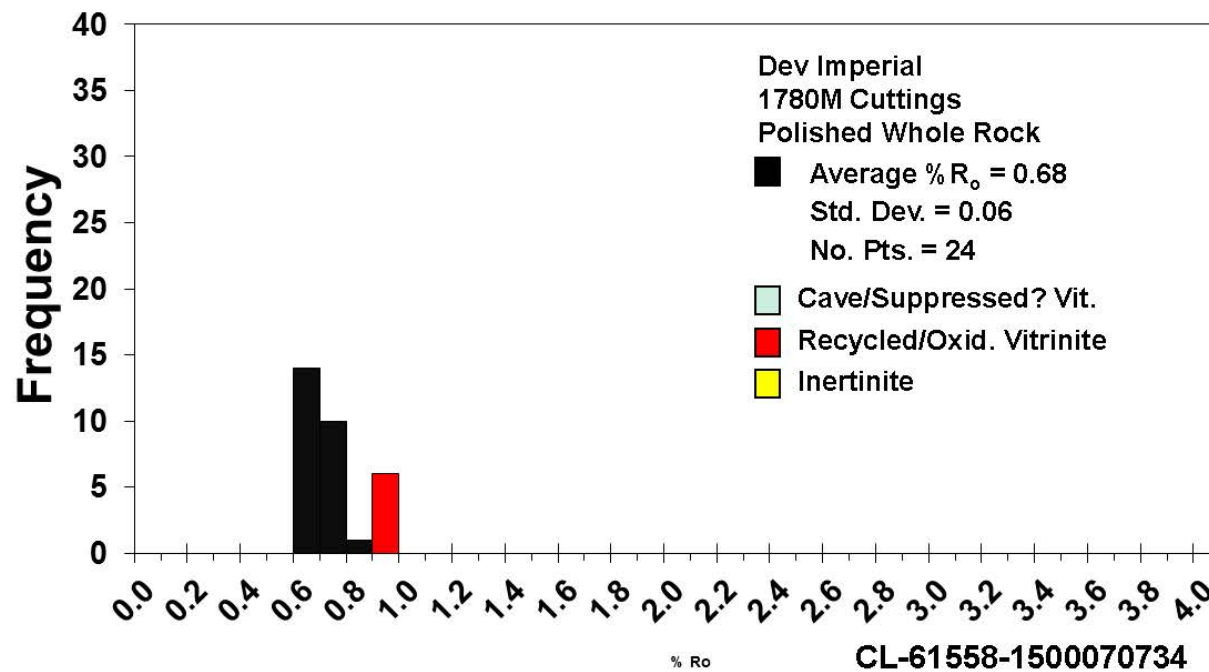
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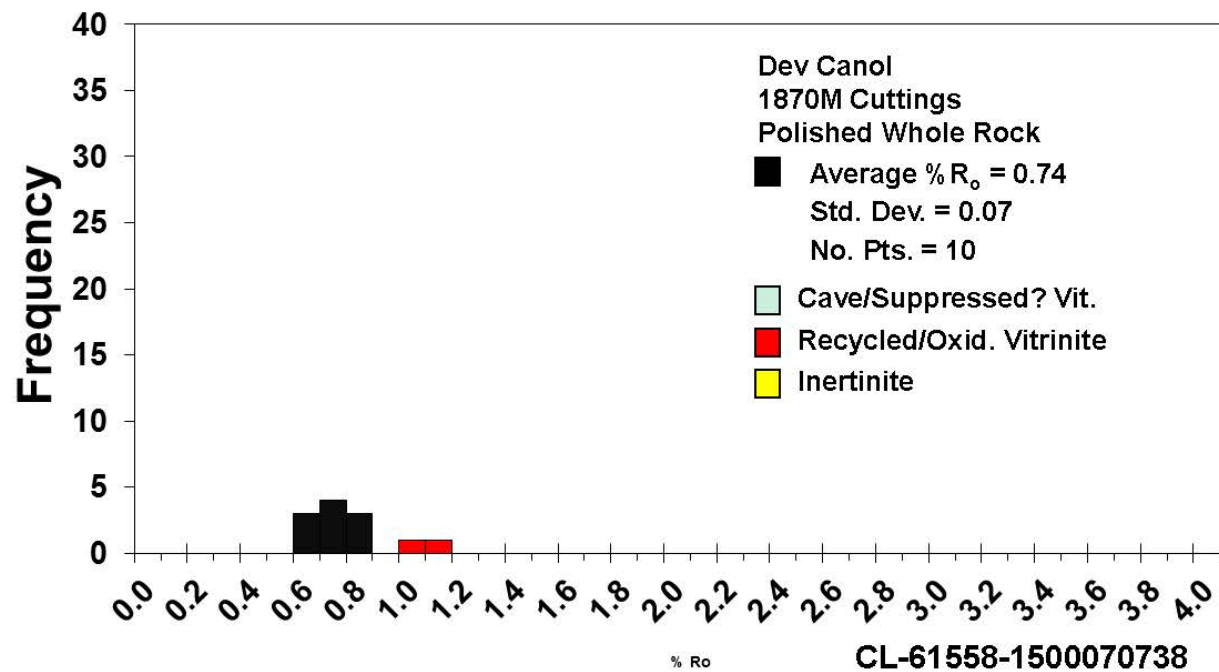
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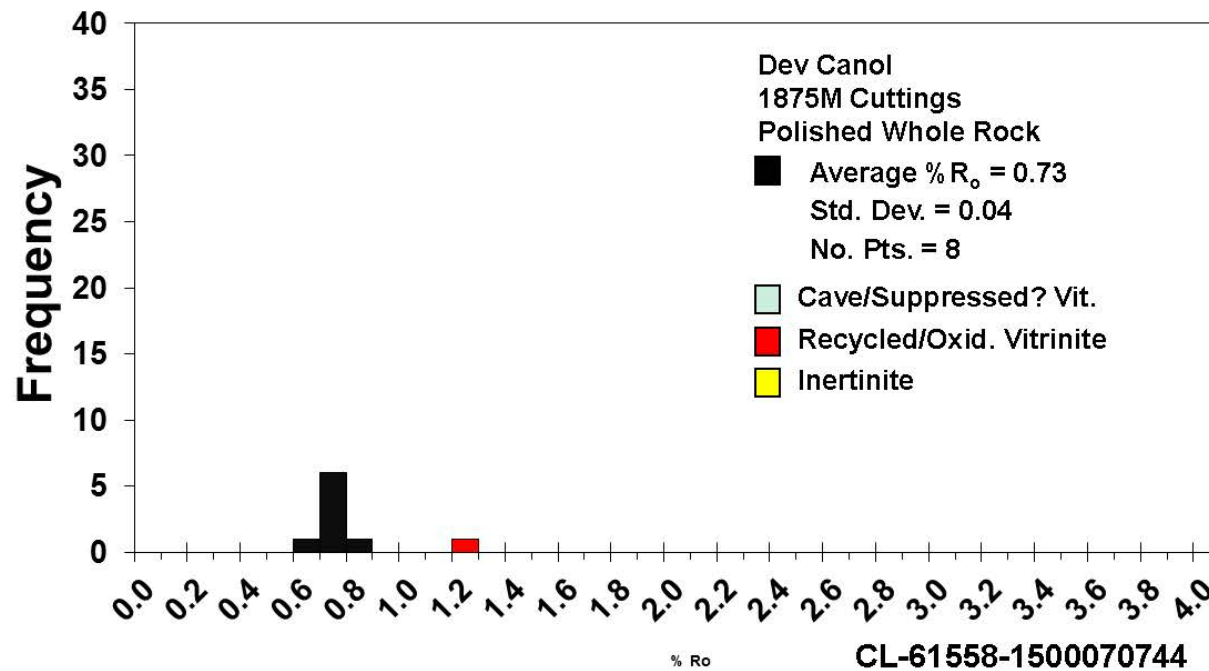


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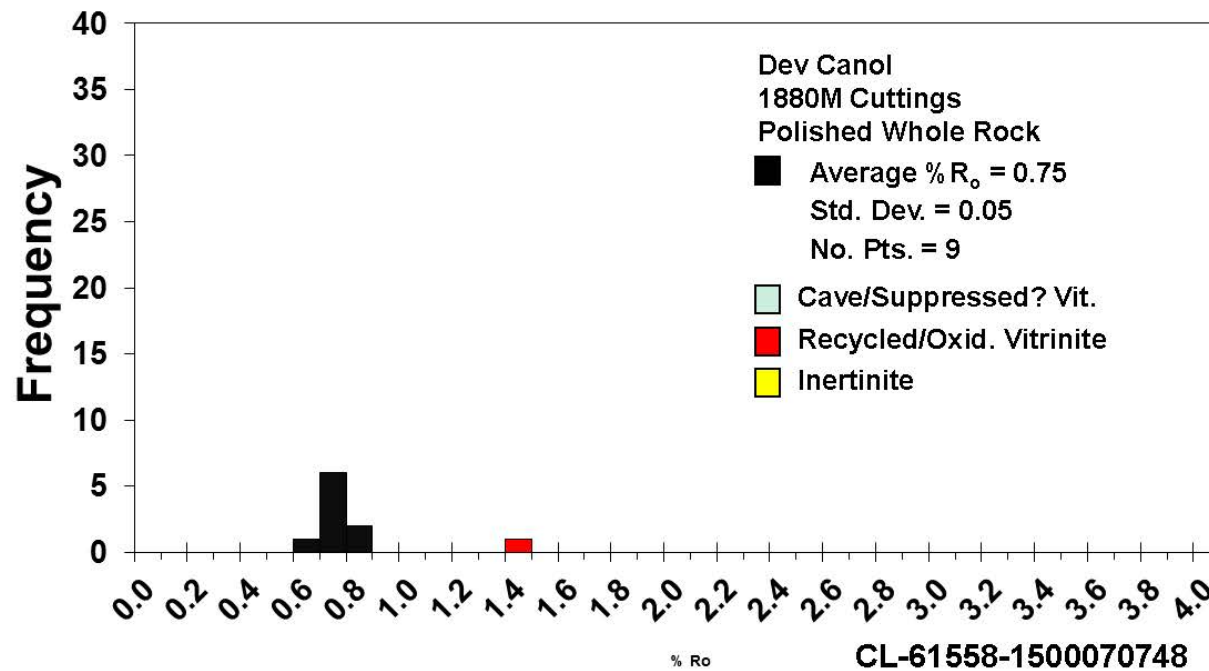




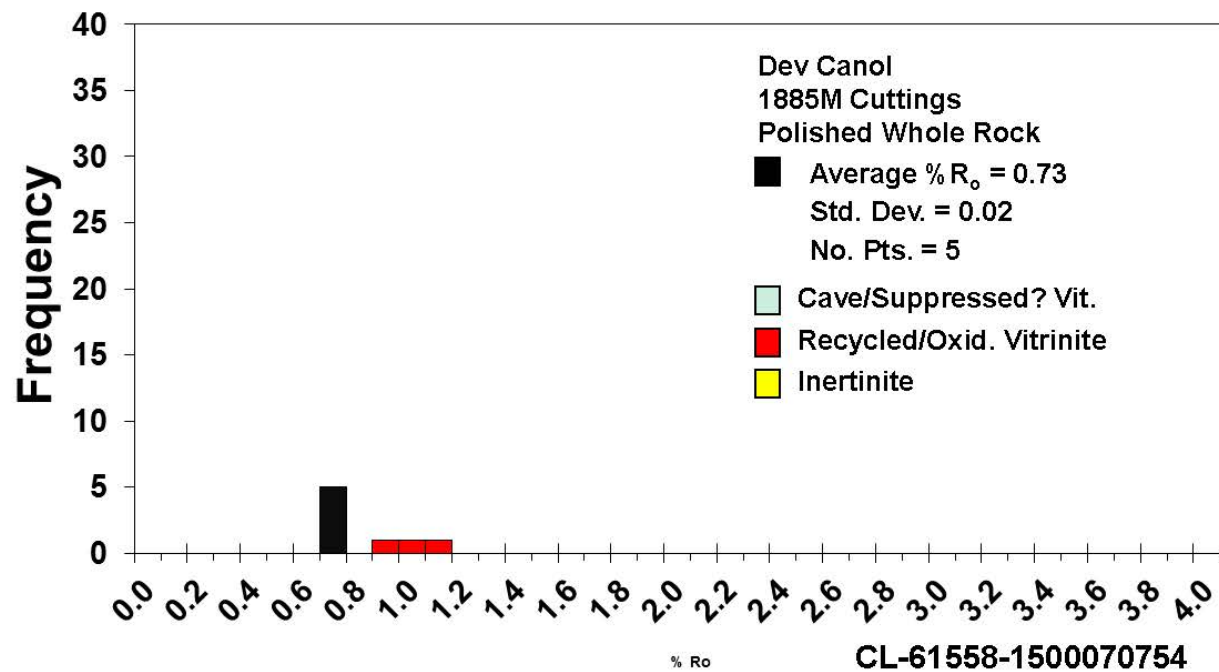
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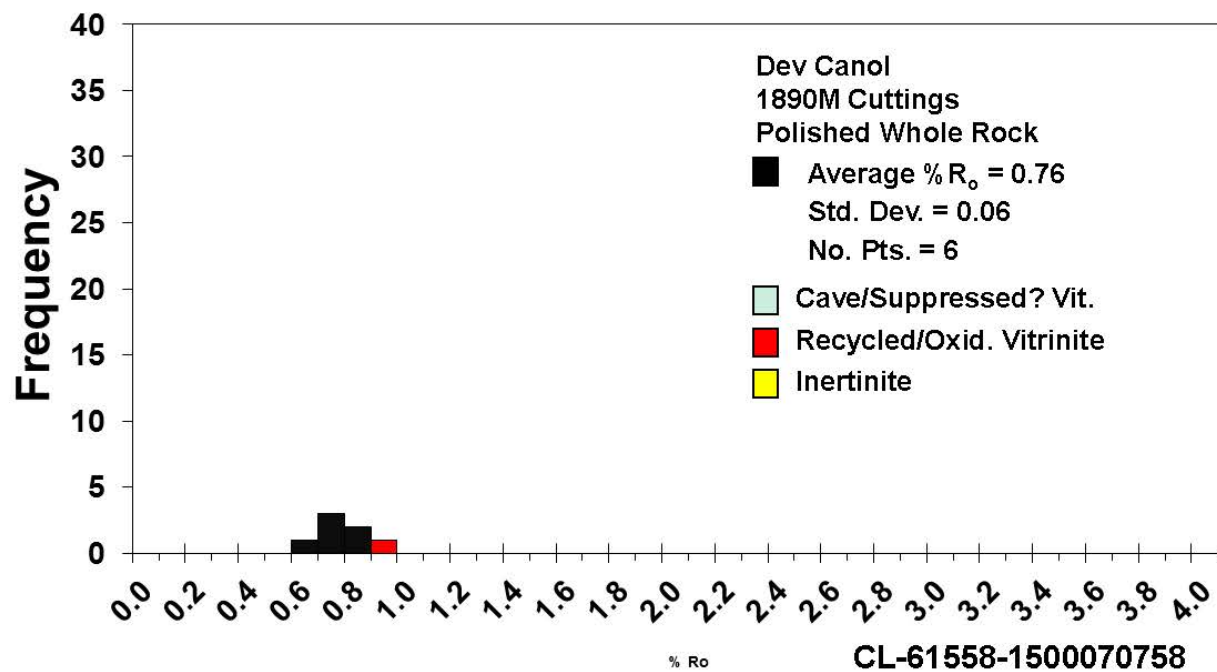
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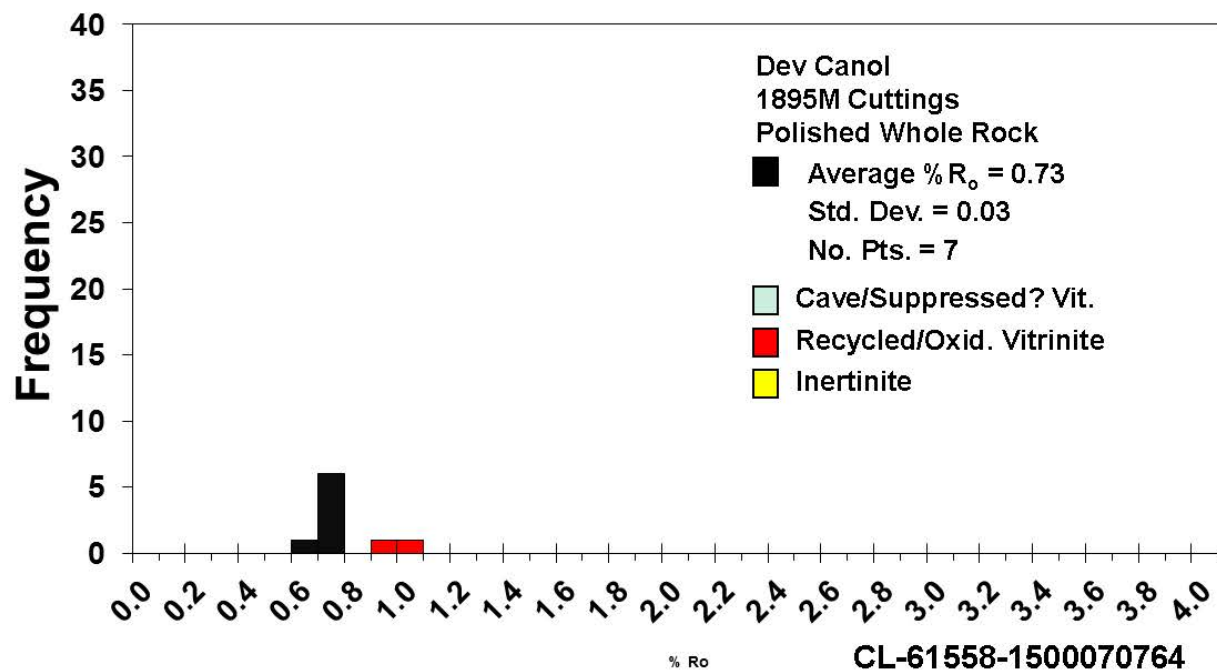


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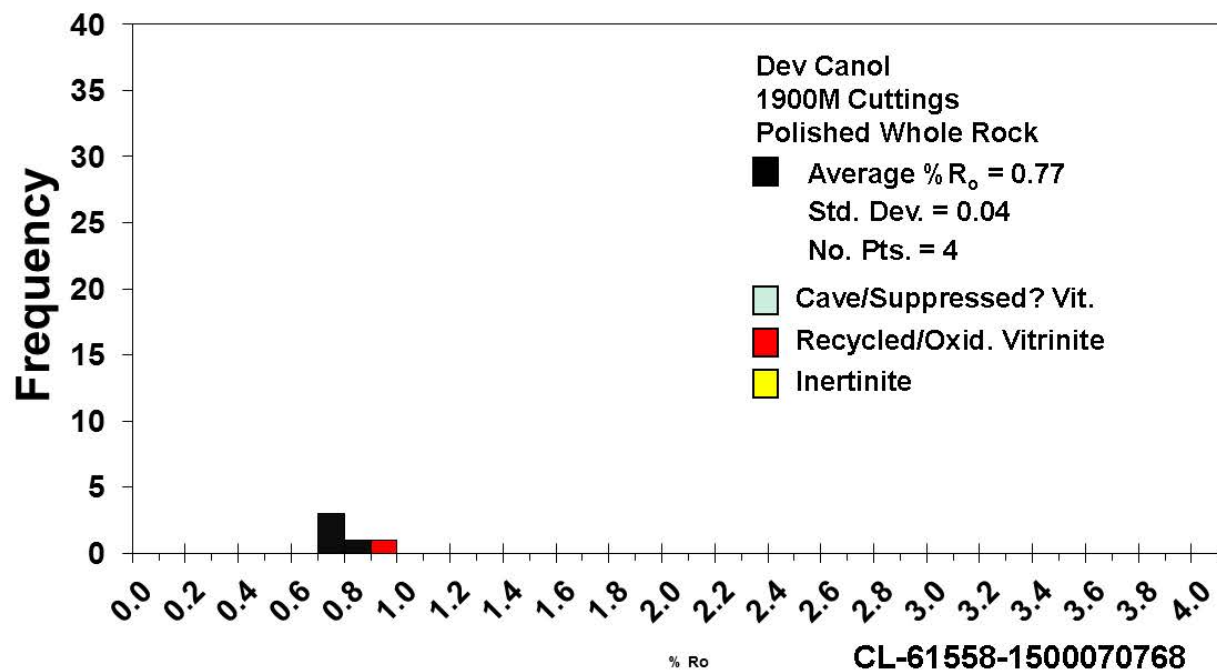




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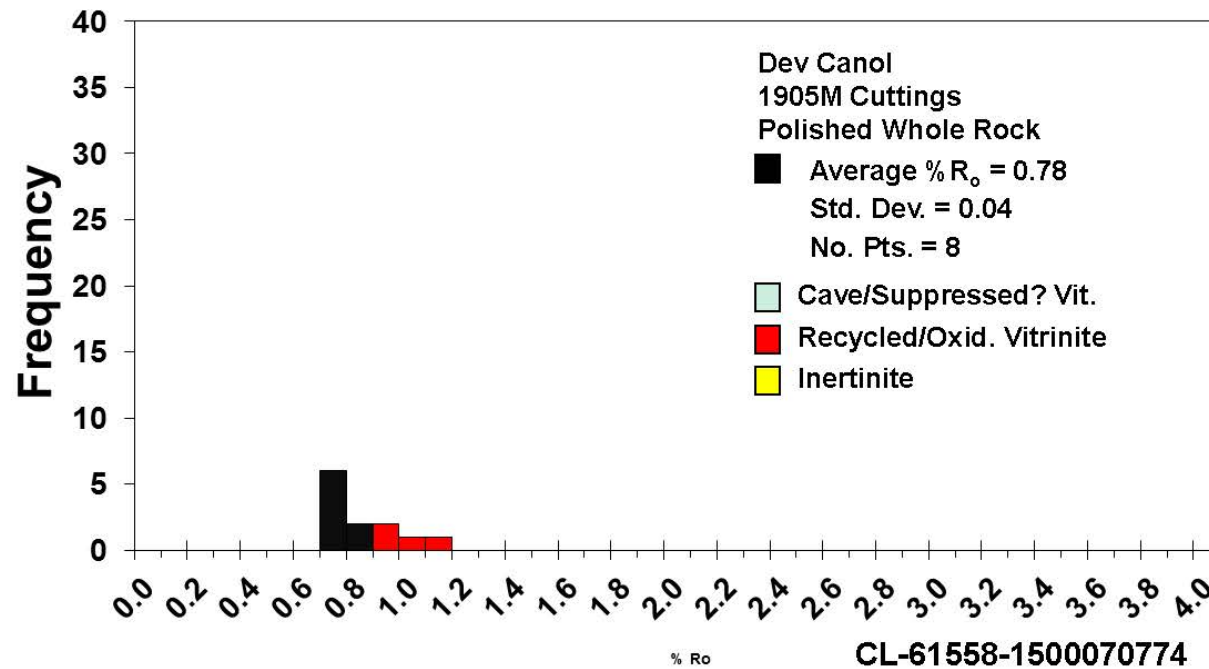


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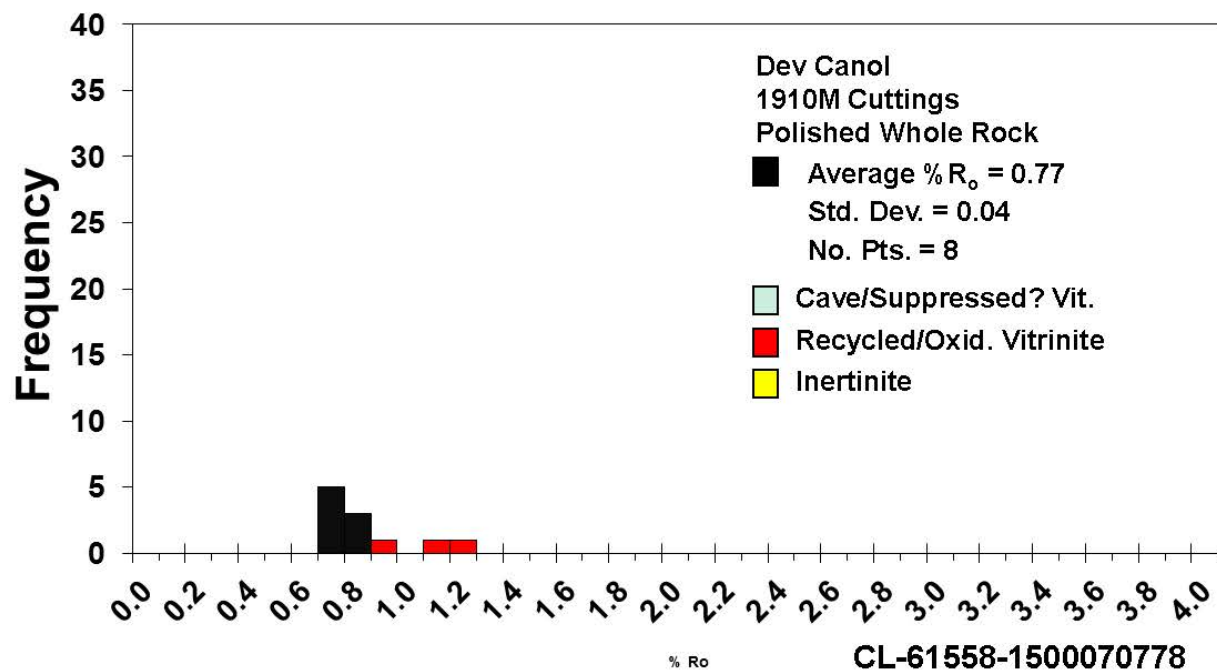




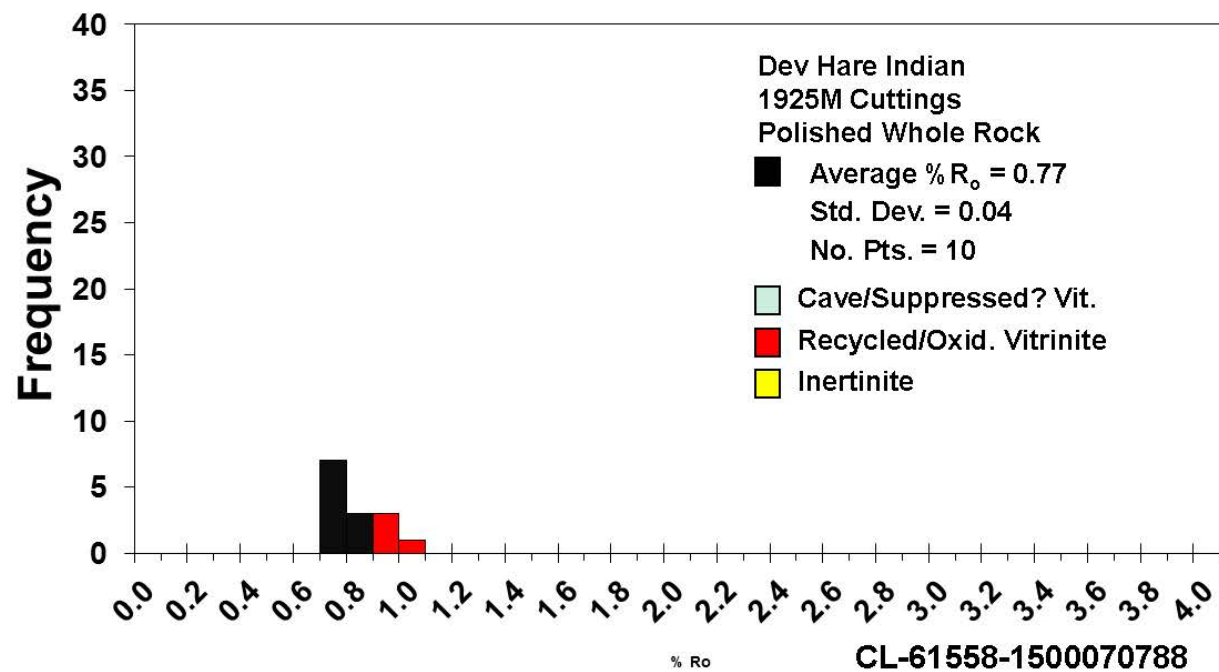
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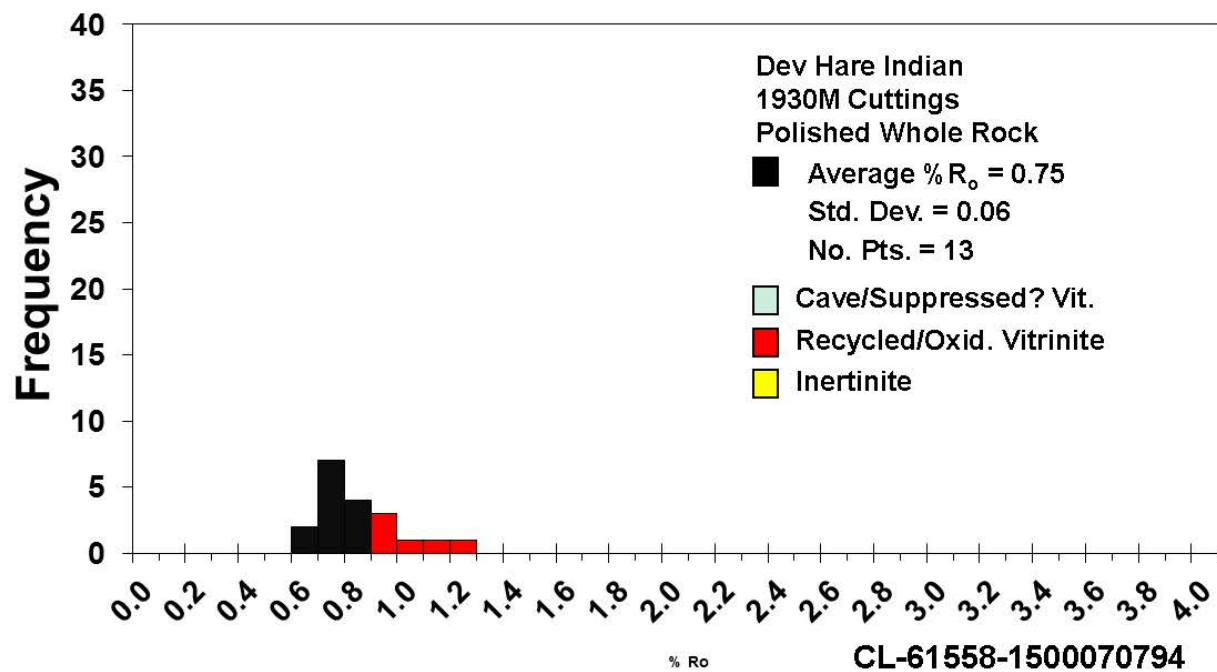
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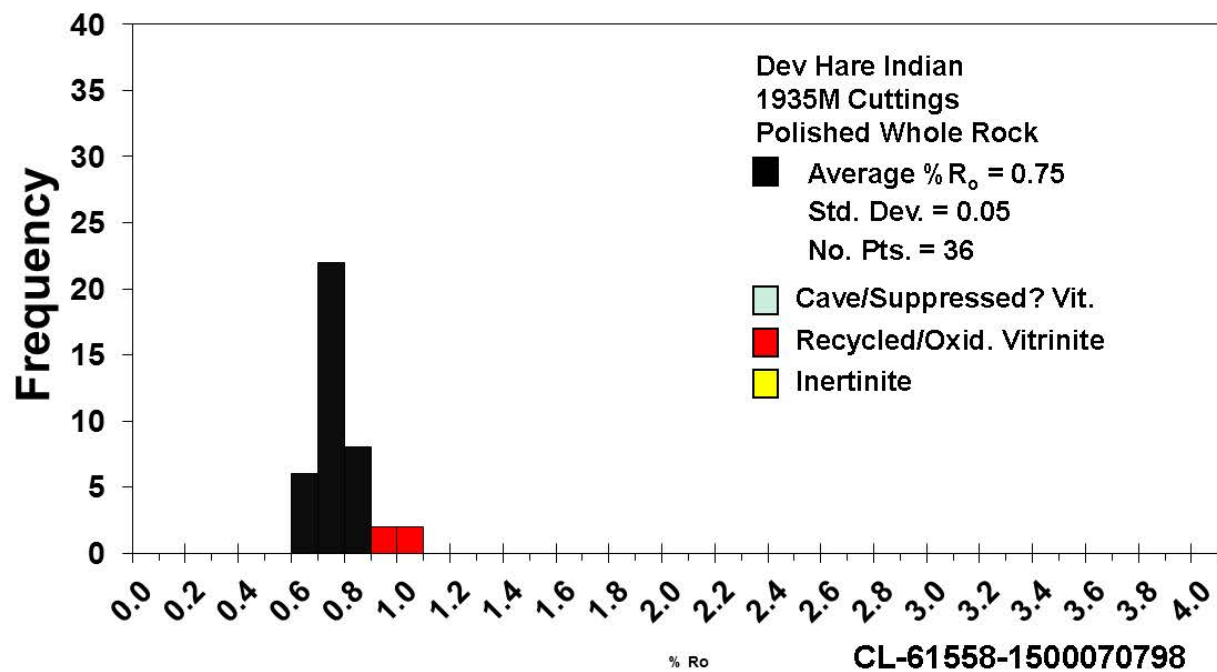
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